

CHUCKSNEY MOUNTAIN MEADOW RESTORATION

USING THE TOOLS OF PRESCRIBED FIRE



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background

The areal extent of dry montane meadows is diminishing throughout the Cascades, and in other areas of the west, due to changes in climate and disturbance regimes. Natural successional processes are resulting in conifer establishment in many meadow communities. Objectives of this project were to: determine if conifer establishment can be retarded by the use of prescribed fire; evaluate the effects of prescribed fire on meadow plant communities and soil productivity; and evaluate the cost effectiveness of restoring a dry montane meadow using prescribed fire.

Chucksney Mountain provides an excellent opportunity to evaluate these questions. Several large, dry meadows with different degrees of conifer encroachment hang from the ridgelines, and the mountain is mostly encircled by deep valleys limiting the risk of escaped fires. These meadows are also important wildlife habitat providing summer forage for elk and deer. The Rocky Mountain Elk Foundation contributed funds to help implement and monitor this project.

Earlier meadow restoration projects have been implemented on Chucksney Mountain (1980 and 1994). Results were largely unquantified and undocumented.

treatment



Prescribed fire was introduced on West Middle Prairie on October 9, 1996. The meadow faces east-southeast near the top of the ridge connecting Grasshopper Mountain and Chucksney Mountain. Slopes are gentle (<20%), dropping off more steeply at the bottom of the meadow (up to 40%). The meadow was divided into an untreated control area (approximately 20 acres), and a treatment area (approximately 60 acres) to evaluate fire effects. The objective was to achieve 50-100% mortality of trees less than 5" in diameter. A head fire was lit from the bottom. The fire had a flame length of 4-6' and spread rapidly, lasting approximately 10 minutes total with less than 1 minute residence time over much of the meadow.

1997 results

TREES

- Approximately 73% of 211 trees, and 66% of 197 seedlings sampled were killed the first year after the fire.
- Mortality varied by species (50-70% for lodgepole pine, 100% for grand fir).

MEADOW VEGETATION

- In general, there was no statistically significant difference in species composition or cover between the burned or unburned portions of the meadow communities.

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USING THE TOOLS OF PRESCRIBED FIRE

- Species composition and cover were affected by the fire within and near the tree islands (less than 1% of the project area). All five herbaceous species present prior to the fire in the center of the tree island were replaced by four new fire pioneer herbaceous species. Plant cover increased in tree island edges.
- Plant nutrient status was not measured, but plants appeared more lush and were more heavily browsed in the burned area (30% of 24 burned plots and 12% of 17 plots in the unburned area were browsed). Increased rodent activity in the burned area was also observed (25% of 24 burned plots; 6% of 17 unburned plots).

SOILS

- Two of six temperature plots recorded soil surface maximum temperatures between 150-250 degrees F.; the other four were below 150 degrees F.
- Bare soil increased up to 7% in the grass/sedge community in burned areas (excluding the tree islands).
- Water repellant soils, increases in bare soil, and changes in soil color in the "A" horizon were observed in the tree islands only (less than 1% of the project area).

COSTS

- Costs to implement the prescribed fire totaled \$400. An additional \$1,200 was spent to establish and maintain the unburned control area for monitoring purposes.
- Costs of mechanical treatment to achieve the same level of tree and seedling mortality is estimated at \$1500.

conclusions

Prescribed fire can be a cost-efficient means of significantly reducing the density of conifers in dry montane meadows. Mortality is highly variable, however, and will depend on site-specific conditions and weather. Ecological conditions resulting from prescribed fire are substantially different from those resulting from mechanical treatment to reduce conifer encroachment. For example, dead trees remain standing after fire providing snag habitat, and plant palatability may increase following fire resulting in increased animal browsing. Soil productivity can be maintained or enhanced with prescribed fire, in the short-term due to nutrient release, and in the long-term due to more vigorous plant growth. Periodic reburns will likely be necessary to maintain the meadow community, possibly every 5-20 years. Additional monitoring is needed to evaluate the effects of the fire on plant biomass and nutritional status, and on soil nutrient status.

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